St Andrew's Church, Whissendine

Bat Management Plan

December 2021

B.A.T. ECOLOGICAL

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Executive Summary

This report presents the draft Bat Management Plan (BMP) for St Andrew's Church in Whissendine, Rutland.

As part of the Bats in Churches Project B.A.T. Ecological were commissioned by Natural England to produce this BMP following bat surveys of St Andrew's in 2021. The strategy presented within this BMP is also based on consultation with key stakeholders regarding bat impacts on the church and possible ways to reduce these. In addition, it considers recent research into mitigating the impacts from bats on churches and information on bat usage of the church provided by the local bat conservation group.

St Andrew's principally supports a maternity colony of *c*.60 adult female Natterer's bats. These bats predominantly roost within the western half of the nave roof but also sometimes roost in the north and south aisle roofs. Almost all Natterer's bats egress and access the church over the east wall of the north transept below the eaves. Natterer's bats (*c*.30-90 adult females) have been recorded roosting within St Andrew's for many years. St Andrew's also supports low numbers of non-breeding common pipistrelle and soprano pipistrelle roosts. This BMP primarily considers and prescribes bespoke measures in respect of the Natterer's bats because the droppings and urine deposited by this colony inside the church cause the most significant issues for the congregation.

This draft BMP considers eight possible approaches to managing the bat issues at St Andrew's. Any measures described within this BMP that will affect bats as European Protected Species (EPS) must be licensed appropriately by Natural England. Any bat management measures adopted at the church must ensure that there is no harm to any bats, and that the Favourable Conservation Status (FCS) of the local bat population of the species concerned will be maintained.

1 Introduction

1.1 Background

1.1.1 This report presents the draft Bat Management Plan (BMP) for St Andrew's Church, Whissendine, Rutland, LE15 7HL, which is referred to hereafter as "St Andrew's" or "the church".

1.1.2 This draft BMP is based on the findings of a detailed suite of bat surveys of St Andrew's completed by B.A.T. Ecological in 2021. B.A.T. Ecological were commissioned by Natural England to undertake the 2021 bat surveys of St Andrew's and produce a BMP as part of the Bats in Churches (BiC) Project.

1.1.3 The possible strategies presented within this BMP are based on consultation with key stakeholders regarding the bat impacts on the church and options to reduce these. In addition, they consider recent research into mitigating the impacts from bats on churches, and information on bat usage of the church provided by the local bat conservation group.

1.1.4 St Andrew's principally supports a maternity colony of *c*.60 adult female Natterer's bats *Myotis nattereri*. These bats predominantly roost within the western half of the nave roof in mid-summer but also sometimes roost in the north and south aisle roofs, for example in late summer 2021. Almost all Natterer's bats egress and access the church over the east wall of the north transept / kitchen below the eaves. Natterer's bats (*c*.30-90 adult females) have been recorded roosting within St Andrew's for many years.

1.1.5 St Andrew's also supports low numbers of non-breeding common pipistrelle *Pipistrellus pipistrellus* and soprano pipistrelle *P. pygmaeus* roosts.

1.1.6 This BMP primarily considers bespoke measures in respect of the Natterer's bats because the droppings and urine deposited by this colony inside the church cause the most significant issues for the congregation.

1.1.7 Any measures recommended within this BMP that will affect bats as European Protected Species (EPS) must be licensed appropriately by Natural England. Any bat management measures adopted at the church must ensure that there is no harm to any bats, and that the Favourable Conservation Status (FCS) of the local bat population of the species concerned will be maintained.

1.1.8 The law pertaining to bats is described in section 2. The findings of the bat surveys undertaken at St Andrew's in 2021 are provided in section 3. Section 4 evaluates the bat survey effort and stakeholder consultation, and the bat management options for St Andrew's are then considered in section 5. Section 6 comprises references. Section 7 (appendices) provides the 2021 bat survey results and methods.

1.2 Church Location and Description

1.2.1 The central Ordnance Survey Grid Reference (OSGR) of St Andrew's is SK 83310 14311 and it is located here: https://goo.gl/maps/zYdaHGTxCGnyfLx68.

1.2.2 St Andrew's is situated on Main Street in Whissendine. Whissendine is a rural village in the county of Rutland, England. It is *c*.5 km to the north-west of the market town of Oakham. St Andrew's is within the Church of England Oakham Benefice and the Diocese of Peterborough.

1.2.3 Photograph 1.2.1 shows St Andrew's viewed facing north-east from Main Street.

Photograph 1.2.1: St Andrew's Church, Whissendine, viewed facing north-east from Main Street.

1.2.4 St Andrew's is a large church that comprises: a clerestoried nave; a large tower adjoining the western end of the nave; a chancel adjoining the eastern end of the nave; a north aisle; a north transept which contains a kitchen, toilet, and the organ; a north vestry adjoining the chancel; a south aisle with an adjoining south porch; and a south transept which contains the lady chapel.

1.2.5 St Andrew's is constructed from coursed and squared Barnack limestone with some ironstone.

1.2.6 The shallow-pitched roofs of the nave, chancel, aisles, and transepts of St Andrew's are covered externally with lead. The roof of the south porch is covered with Collyweston tiles. The roof of the north transept is covered with slate. The roofs of the nave, chancel, and aisles are parapeted. The roofs of the transepts are not parapeted, and the timber rafters of these roofs extend beyond the wall plate below the eaves.

1.2.7 The high nave roof inside St Andrew's is shallow-pitched and has medieval carved bosses, moulded ribs and purlins, and tie beams braced down onto wall posts carved in the shape of large crouching figures, several of which have settled away from the walls.

1.2.8 The lower pent roof of the north aisle is significantly smaller than the roof of the south aisle. There are several arches buttressing the north arcade within the north aisle. The timber roof of the south aisle is relatively modern and has moulded arch braced tie-beams on carved stone corbel heads. At the eastern end of the south aisle is a wide pointed arch to the south transept, which is screened off with glass from the rest of the church to form the lady chapel.

1.2.9 Inside St Andrew's most of the stone walls are exposed. The chancel walls differ, however, as they are panelled to cill height and plastered above this. The floors inside the church predominantly comprise plain red and white tiles although the chancel has a black and white marble floor.

1.2.10 The churchyard of St Andrew's supports several mature trees to the north of the church, and beyond the churchyard in this direction is open countryside. Otherwise, to the east, south,

and west of the churchyard are the various buildings, gardens, communal areas, etc. of Whissendine.

1.3 Statement of Heritage Significance

1.3.1 St Andrew's is a Grade I listed building dating mainly back to C13 and C14, with extensive re-windowing and re-roofing in C15 and further restoration from 1867 to 1870. The chancel was refurnished in early C20.

1.3.2 As part of the initial phases of the BiC Project a Statement of Significance (SoS) was prepared in respect of the heritage importance of each project church and the impact upon it from bat activity. The following comprises the executive summary from the BiC SoS for St Andrew's (authored by Neil Burton) in June 2020:

> "*The church is of high historical, archaeological and architectural significance and has considerable townscape value, not least for its tall Perpendicular tower. It is listed Grade I. The building dates mainly from the thirteenth and fourteenth centuries, with extensive re-windowing and re-roofing in the fifteenth century. Medieval fabric of high significance includes the carved stonework (friezes, gargoyles, window tracery, the heavily moulded arcades and other arches and carved corbels) and the fifteenth century timber roofs of the nave and north aisle. There are few old furnishings, following a restoration in the late 1860s, although that restoration introduced a very handsome early sixteenth century timber screen brought from the old chapel of St John's College Cambridge. The chancel was refurnished in the early twentieth century, with fittings from the studio of C. E. Kempe.*
>
> *It is evident that bats are having a widespread and marked impact on fabric and furnishings of high significance, as well as making the building difficult to use. Short term remedial measures could include covering the most vulnerable items, but this is a large church and it would not be practicable to keep all furnishings covered. The nave roof, suspected home to many roosts, is shallow pitched, and it may not be easy to fit bat boxes unobtrusively. It is likely that consideration will need to be given to the blocking of entry points and the provision of alternative roosting sites outside the church. As a first step a survey is required to confirm species, roost locations and access points and to inform strategies for mitigation*".

1.3.3 Refer to the Statement of Significance (BiC Project, June 2020) for more detail including on any items of special heritage importance at the church.

2 Relevant Legislation

2.1.1 The following is intended only as a guide to the legislation relating to bats. It does not purport to give legal advice and the Acts should be referred to directly for the precise legal wording.

2.1.2 All bats and their roosts are protected in England and Wales via the Conservation of Habitats and Species Regulations 2017 (as amended, including by the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019) which are commonly referred to as the 'Habitats Regulations'. Bats and their roosts are also protected in the UK under the Wildlife and Countryside Act 1981 (as amended), which was reinforced in England and Wales by the Countryside and Rights of Way Act 2000.

2.1.3 In combination, the above legislation makes it an offence to:

- Deliberately capture, injure, or kill a bat.
- Deliberately disturb any bat; in particular, any disturbance which is likely to (i) impair a bats' ability to survive, breed, reproduce or to rear or nurture their young; or in the case of hibernating or migratory species, to hibernate or migrate; or (ii) to affect significantly the local distribution or abundance of the species to which they belong.
- To be in possession or control of any live or dead bat or any part of, or anything derived from a bat.
- Damage or destroy a breeding site or resting place of a bat.
- Intentionally or recklessly obstruct access to any place that a bat uses for shelter or protection.
- Intentionally or recklessly disturb a bat while it is occupying a structure or place that it uses for shelter or protection.

2.1.4 The term 'roost' is not used in the above legislation, however, a site that a bat uses for breeding, resting, shelter or protection is called a roost in ecological terms. Bats tend to re-use the same roost sites and sometimes over many years but may not always be in residence. Current legal opinion is that a roost is protected irrespective of whether the bats are present.

2.1.5 *Damaging or destroying* a place used by a bat for breeding or resting anywhere in the UK is an *absolute offence* carrying *strict liability* under the Habitats Regulations. This means that no element of intent, reckless, or deliberate action needs to be evidenced to establish guilt; the prosecution only needs to demonstrate that the accused performed the prohibited act.

2.1.6 Where an activity will result in any destruction, damage, or obstruction of any bat roost, whether occupied or not, or it risks harming or disturbing bats, then a licence is required from the Statutory Nature Conservation Body (e.g., Natural England) to derogate the law to facilitate this activity.

2.1.7 In determining whether to grant a licence for an activity affecting a European Protected Species (EPS) Natural England must apply the requirements of Regulation 53 of the Habitats Regulations, and, in particular, the following three tests set out in sub-paragraphs (2)(e), (9)(a) and (9)(b):

1. Regulation 53(2)(e) states that: a licence can [only] be granted for the purposes of "*preserving public health or public safety or other imperative reasons of overriding*

public interest including those of a social or economic nature and beneficial consequences of primary importance for the environment".

2. Regulation 53(9)(a) states that the appropriate authority shall not grant a licence unless they are satisfied "*that there is no satisfactory alternative*" to the proposed actions; and,
3. Regulation 53(9)(b) states that the appropriate authority shall not grant a licence unless they are satisfied "*that the action authorised will not be detrimental to the maintenance of the population of the species concerned at a favourable conservation status in their natural range*".

2.1.8 These three tests are commonly referred to as the 'purpose test', the 'NSA test' and the 'FCS test' respectively.

2.1.9 Note that the original legislation which provides the framework for licensing in respect of bats was transposed from European Union (EU) directives, and as such bats continue to be referred to as EPS despite the UK's withdrawal from the EU.

2.1.10 There are two approaches to licensing work in places of worship that will affect bats and would otherwise be illegal: a 'normal' EPS Mitigation Licence (EPSML), or the Bats in Churches Class Licence (BiCCL).

2.1.11 The BiCCL is a unique licence designed to help suitably qualified, experienced, and trained bat ecologists (Registered Consultants) to manage the adverse effects of bat activity on places of worship. Issued under the Habitats Regulations, this licence permits Registered Consultants (only) to disturb and capture bats, and damage and destroy resting places and breeding sites using a range of management techniques to reduce the negative impacts of bat populations using places of worship, and to carry out necessary repair works. The use of the licence is subject to:

- Surveying to required standards to inform baseline information about bat populations using the registered site, including species, numbers, roost types, times of year the roost is in use and access points, and to inform long-term monitoring requirements;
- All necessary permissions and consents being in place prior to applying to register a site unless exceptional circumstances apply;
- Registration of the site and written confirmation from Natural England that works may proceed; and,
- Submission of annual reports of licensed activities and monitoring by 15 January each year, and submission of records to the relevant Local Records Centre annually.

2.1.12 Registered Consultants must implement management measures to safeguard bats and ensure that the ecological function of the site is maintained for the registration period. Natural England make an assessment of each annual report to ensure compliance with the ecological approach set out in the authorised site registration form, and, where necessary, Registered Consultants must adapt management and monitoring measures.

3 Bat Usage of the Church

3.1 Previous Information

3.1.1 Natterer's bats (*c*.30-90 adult females) have been recorded roosting within St Andrew's for many years. Jenny Harris of Leicestershire and Rutland Bat Group (LRBG) has been monitoring the bats at St Andrew's since 1998 (Jenny Harris, *pers. comm*. November 2021).

3.1.2 From 2000 to 2018 (except in 2017) Jenny has counted the Natterer's bats at St Andrew's for the Bat Conservation Trust National Bat Monitoring Programme (NBMP) Colony Count. This involves two counts of the number of Natterer's bats emerging from the church at dusk in June each year. The two NBMP counts are timed for June because any pups are highly unlikely to have been weaned and flying in June, and as such the count should represent only adult bats. Given the roosting ecology of Natterer's bats most adult bats within a colony of this species in June will be females (e.g., Altringham, 2003; Smith and Racey, 2005).

3.1.3 The peak NBMP count of Natterer's bats at St Andrew's in 2000 was 74 bats. The lowest peak counts of Natterer's bats at St Andrew's during the above period were 33 bats in 2012 and 34 bats in 2013. The highest peak counts of Natterer's bats at St Andrew's during the above period were 89 bats in 2001 and 81 bats in 2003. With a peak count of 89 animals this is the sixth largest Natterer's bat colony in the East Midlands that is monitored as part of the NBMP.

3.1.4 From 2000 to 2008 the peak counts of Natterer's bats at St Andrews ranged from 67 to 89 bats; in 2009 there was a peak count of 55 Natterer's bats, and from 2010 until 2018 the peak count of bats ranged from 33 to 45 Natterer's bats. Jenny Harris and other members of LRBG believe that the reduction in the number of Natterer's bats roosting within St Andrew's from 2010 until 2018 is likely to be because floodlights were installed outside the church in 2008 to illuminate the tower. Many bat species and colonies are adversely affected by bright lighting (e.g., Zeale *et al*., 2016). The floodlights were switched off in the spring and summer of 2020 while the church was closed due to the Covid-19 pandemic. The peak count of Natterer's bats at the church in June 2020 was 60. In 2021 the floodlights were also switched on less often during the summer than in previous years. The peak count of Natterer's bats in the pre-partum period of 2021 was 61 – see section 3.2.

3.1.5 Jenny Harris also reports that until 2001, when the glass screens were installed inside the south transept of St Andrew's to create the lady chapel, the Natterer's bats principally egressed and accessed the church via gaps along the wall plate below the eaves along the east wall of the south transept. As part of the work to create the lady chapel an alternative access / egress feature was created for the bats along the wall plate of the east wall of the north transept, which is what the bats use now.

3.2 2021 Bat Surveys

3.2.1 Appendix 7.1 provides a plan of the key findings from the suite of professional bat surveys undertaken by B.A.T. Ecological at St Andrew's in 2021.

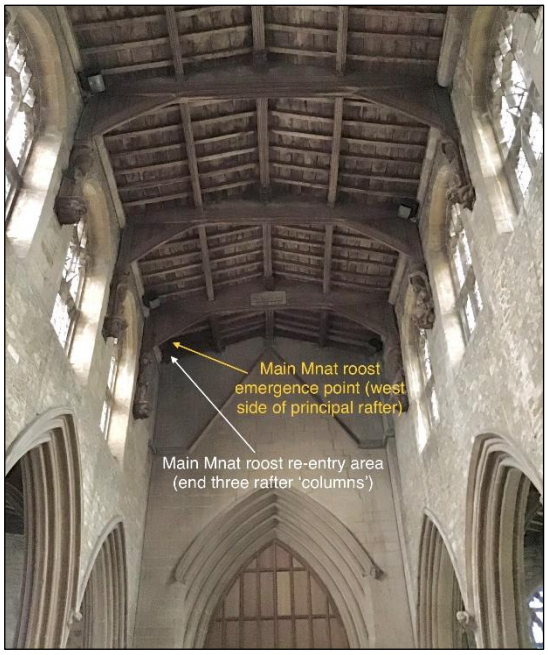
3.2.2 The 2021 bat surveys confirmed that St Andrew's principally supports a maternity colony of *c*.60 adult female Natterer's bats. These bats predominantly roost within the western half of the nave roof in mid-summer but also sometimes roost in the north and south aisle roofs, for example in late summer 2021. Almost all Natterer's bats egress and access the church over the east wall of the north transept below the eaves.

3.2.3 The 2021 bat surveys also confirmed that St Andrew's supports low numbers of transient (non-breeding) day roosts of common pipistrelles and soprano pipistrelles. These bats roost

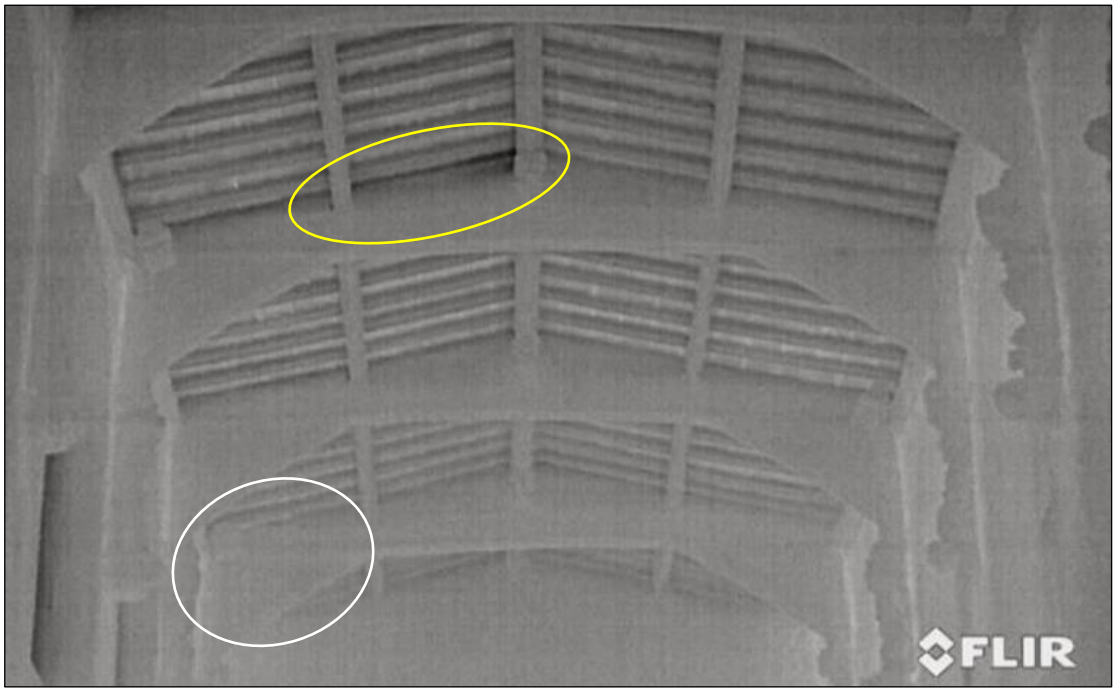
individually in several locations, such as on the tops of walls and where roof timbers abutted walls. The Pipistrelles egressed and accessed the church over the wall plates / below the eaves of the transepts including, on occasion, via the features used by Natterer's bats.

3.2.4 Photographs 3.2.1 to 3.2.11 show and describe the key features used by bats at St Andrew's during the 2021 surveys.

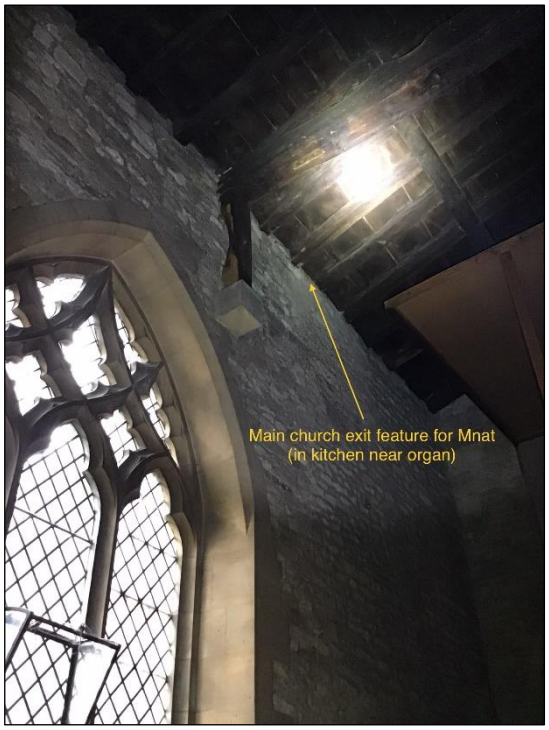
Photographs 3.2.1 (left) and 3.2.2 (right): The majority of the Natterer's bats roosted near the south-west corner of the nave roof on the late May pre-partum survey visit, egressing and accessing the roost in the locations shown by the yellow and white arrows (Mnat = *Myotis nattereri*).

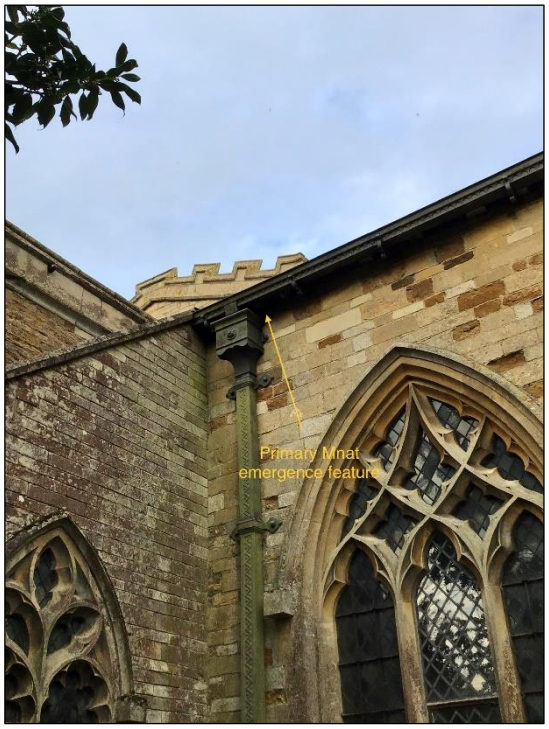


Photograph 3.2.3: Most of the Natterer's bats roosted in a different location within the nave roof on the August survey compared to the May survey. The yellow oval shows the heat signature (the dark area) of the colony on the thermal camera on 3 August. The white oval shows where the bats roosted in May.

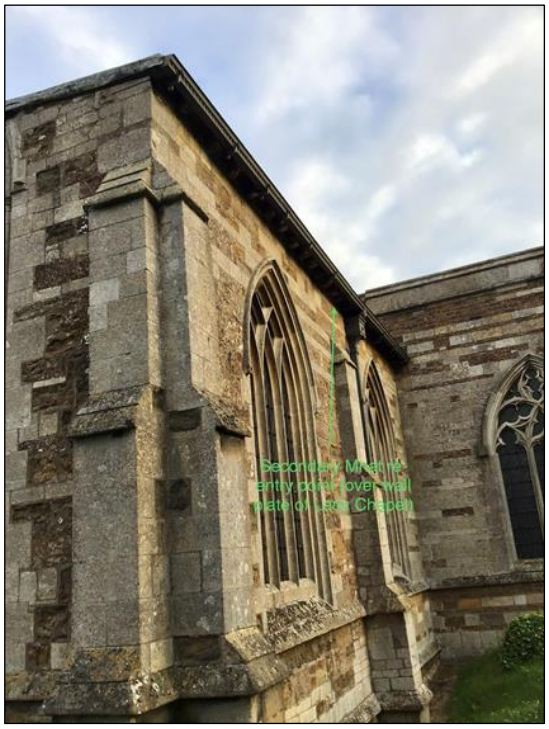


Photographs 3.2.4 (left) and 3.2.5 (right): Internal and external views of the area in the north transept / kitchen used by most of the Natterer's bats to egress and access St Andrew's on the 2021 nocturnal surveys. Bats egress and access the church alongside the rafters on the wall top / below the eaves.

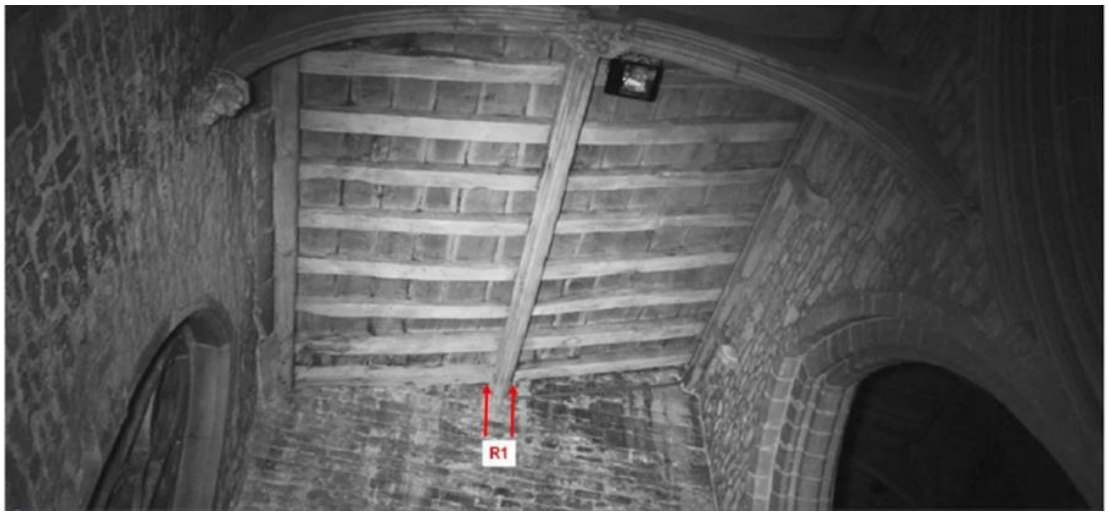




Photographs 3.2.6 (left) and 3.2.7 (right): Internal and external views of the wall top / east facing eaves of the south transept / lady chapel. Gaps here were used by a small number of Natterer's bats and both Pipistrelle species to egress and access St Andrew's on the 2021 nocturnal surveys.



Photograph 3.2.8: On the September survey most of the Natterer's bats were recorded roosting within the aisles. R1 below depicts the location where 30 Natterer's bats emerged, alongside the central purlin in the middle area of the north aisle – see appendix 9.1, target note 4.



Photograph 3.2.9: The red ovals below depict two locations in the south aisle where several Natterer's bats were also recorded roosting on the September survey at St Andrew's.

Photographs 3.2.10 (left) and 3.2.11 (right): Internal and external views of the north transept / kitchen. Gaps along the wall tops and below the eaves, such as those shown by the yellow arrows on the west facing elevation, were used by some of the Pipistrelles to egress and access the church.

3.2.5 Table 3.2.1 shows the numbers of bats recorded exiting from St Andrew's on the 2021 dusk emergence surveys. The late May count is within the pre-partum period described above and as such the number of Natterer's bats recorded on this survey at St Andrew's is assumed to be the current baseline number of adult female bats in the colony, i.e., 61. Note that the common pipistrelles and soprano pipistrelles were not roosting together.

Table 3.2.1: Numbers of bats recorded emerging from St Andrew's on the 2021 dusk emergence surveys.

Date	No. of Natterer's Bats	No. of Common Pipistrelles	No. of Soprano Pipistrelles
28 May	61	5	2
3 August	71	7	4
2 Sept	76	2	2

3.2.6 In addition to the features that are known to be used by bats from the surveys at the church there may be other building features of importance to roosting or hibernating individuals.

4 Evaluation

4.1 Bat Survey Effort and Expertise

4.1.1 The suite of bat surveys undertaken by B.A.T. Ecological at St Andrew's in 2021 was completed in accordance with current best practice guidance in respect of professional bat surveys generally – see Collins (ed.) 2016 - and those of churches – see BiCCL Annex B '*Minimum Survey Standards for Site Registration*'.

4.1.2 This BMP has been authored by Matt Cook BSc (Hons) MSc MCIEEM, who also led the 2021 bat surveys of St Andrew's. Matt is a BiCCL Registered Consultant (RC) with Natural England – licence reference B32RC004. See appendix 9.3 for more information on Matt's experience.

4.2 Stakeholder Consultation

4.2.1 The following provides a timeline of St Andrew's involvement with the BiC Project.

- 29 August 2019 – Initial church visit by BiC Project Engagement Officer Rose Riddell (RR).
- 21 November 2019 – St Andrew's formally invited (by letter) to join the project by Michael Costello, Natural England BiC Project Manager.
- 29 January 2020 - BiC Bat Roost Report Form completed with input from Church Warden Rosemary Powell (RP).
- 16 June 2020 – Statement of Heritage Significance visit by Neil Burton.
- 11 December 2020 – Church Project Plan produced by RR.
- 25 January to 16 February 2021 – Natural England tender period for bat survey and consultancy work at St Andrew's and 24 other BiC churches.
- 2 March 2021 – B.A.T. Ecological awarded contract to undertake bat surveys and produce BMP for St Andrew's. Contract award accepted 4 March.
- 8 April 2021 – Flying Buttress Architecture Ltd. (Simon Bird, SB) appointed to provide architectural services.
- 14 April 2021 - Initial meeting between B.A.T. Ecological (Matt Cook, MC), Church Wardens (led by RP), church architect (SN), and RR. The achieved objectives of this meeting were for the consultant bat ecologist to acquire a good understanding of the issues caused by bats at the church, the preferences of the church representatives in respect of these, and any key architectural or heritage considerations. The bat ecologist also advised the church about the next steps and overall aims of the BiC ecologist. RR also explained what support would be available from the BiC Project.
- April to September 2021 – Suite of bat surveys undertaken by B.A.T. Ecological.
- 2 September 2021 – BiC bat event hosted at St Andrew's with presentations from MC and LRBG, followed by bat count, organised by Claire Streit.
- 20 September 2021 – Progress meeting between MC, SB, church and PCC representatives led by RP, and Rachel Arnold (BiC Heritage Advisor). Different approaches to reduce bat impacts discussed, preferred approach heated bat compartment above kitchen (option 5 in section 5). Indicative costings to be provided by MC and SB.
- 23 September 2021 – Email from MC advising of possible difficulties with heated bat compartment, meaning that this should be accompanied by a bat loft within south porch (option 6 in section 5). SB agreed to obtain costs from contractors for both options. Further email discussion regarding options between MC and SB on 28 Sept and 3 October.
- 27 October 2021 – Consultation by MC with Natural England (Kate Jones) regarding options 5 and 6. MC confirmed to SB and RP via email on 28 October that BMP recommendation would

be for both options.

- 24 November 2021 – BMP contractors quotation provided by SB.
- 2 to 7 December 2021 – MC expressed further concerns regarding heated bat compartment via email to RP on 2 December. Concerns forwarded to, and commented on, by SB on 3 December. Further comments by MC on 7 December. Zoom meeting to revisit approach to bat mitigation suggested by RP. Zoom meeting scheduled for 14 December.
- 14 December 2021 – Zoom meeting between RP, SB, MC, RR, and RA. Agreement reached to present all bat management options in draft BMP for comment by DAC at site meeting. Draft BMP issued.

4.2.2 In addition to the above, informal discussions regarding the bats and possible solutions to reduce their mess inside St Andrew's have taken place (via email and onsite) with Jenny Harris of LRBG, who has been very helpful in providing information on bat usage of the church.

4.3 Overall Evaluation

4.3.1 Every effort has been made to provide a comprehensive ecological appraisal and appropriate recommendations in the context of the commissioned scope of works and the overall aims of the BiC Project for St Andrew's.

4.3.2 It is considered that the level of bat survey effort and expertise and extensive stakeholder consultation involved at St Andrew's, in the context of relevant research into bat mitigation measures in churches, wildlife law, and heritage and architectural considerations and advice, provides a robust platform for the recommendations contained within this report.

4.3.3 Notwithstanding the above, however, it remains important to note that it is impossible to completely characterise or predict the natural environment as wild animals are inherently unpredictable, all habitats are subject to change, and species may colonise or vacate areas for a variety of reasons after surveys have taken place or mitigation has been implemented.

5 Consideration of Bat Management Options

5.1 Option 1: Do Nothing

5.1.1 Balancing the need to protect churches and bats - our cultural and our natural heritage - is very challenging. Conserving the bat colonies that occupy churches is important because the bats may not have any alternative suitable roost sites and the loss of an important roost could significantly harm bat populations that are already threatened. At the same time, however, churches are often very important buildings historically and culturally, and they can suffer significant negative effects from colonies of bats. St Andrew's is an important community hub within Whissendine but church activities are constrained by the mess deposited by the bats. The upkeep of an old church without bats is already difficult, and the mess left by bats places an added burden on those that clean and use it.

5.1.2 The 2020 BiC SoS (Neil Burton) for St Andrew's made the following statement regarding the impacts and recommendations in respect of the bats:

"*The impact of bats is widespread, and evidently harmful to fabric and furnishings of high significance, as well as making the building difficult to use. Short-term remedial measures could include covering the most vulnerable items, but this is a large church and it would not be practicable to keep all furnishings covered. It is understood that there have been discussions in the past about bat management in connection with the glazing in of the south transept. The nave roof, suspected home to many roosts, is shallow pitched, and it may not be easy to fit bat boxes unobtrusively. It is likely that consideration will need to be given to the blocking of entry points and the provision of alternative roosting sites outside the church. As a first step a survey is required to confirm species, roost locations and access points and to inform strategies for mitigation*".

5.1.3 Based on the above, and the wider context and principle aim of the BiC Project, the representatives of St Andrew's feel that it is not appropriate to 'do nothing' at the church in respect of the impacts from the bats. As such, this option was presumably rejected prior to B.A.T. Ecological being instructed by Natural England.

5.2 Option 2: Exclusion

5.2.1 Zeale *et al*. (2014, 2016) used population modelling to predict the impacts of exclusion on colonies of Natterer's bats when researching strategies to mitigate the impacts on churches from this species. This research concluded that exclusion is likely to have a negative impact on the welfare and FCS of Natterer's bats, principally because they may struggle to relocate to new roosts and establish new foraging areas quickly, which could then reduce productivity and affect survival, and so have a negative impact on population growth.

5.2.2 There is only one known study to have examined the demographic consequence of roost exclusion on any bat species – the big brown bat *Eptesicus fuscus* in Canada. Brigham & Fenton (1986) showed that despite individuals of this species relocating to roosts nearby, mean litter size was significantly lower (56% reduction) following exclusion (0.86 ± 0.30 at control sites; 0.38 ± 0.30 following exclusion). Zeale *et al.* (2014, 2016) concluded that a change of similar magnitude could have profound consequences for Natterer's bat populations in England.

5.2.3 Based on the above research it can be concluded that excluding *c*.60 adult Natterer's bats from St Andrew's would have a significant adverse effect on this colony and the effect of any exclusion could adversely affect the FCS of the local population. On this basis, from a legal perspective alone Natural England cannot issue a licence to exclude the bats from St Andrew's because the NSA and FCS tests of Regulation 53 of the Habitats Regulations could not be satisfied by such an action – see section 2

5.2.4 Notwithstanding the above, exclusion would be against the spirit of the BIC Project and its principal aim "to *transform support for church communities with nationally important historic churches with*

protected bat roosts …… to create a sustainable partnership that will safeguard a future for bats, historic places of worship and for the people who use them".

5.2.5 In practical terms it can also be very difficult to exclude a large colony of bats from a large old church, which they are likely to have used every year for decades, and where there are many apertures that provide potential roost and roost access opportunities.

5.2.6 Based on the above ethical, legal, and practical reasons the Natterer's bats cannot be excluded from St Andrew's and as such the colony will be retained at the church.

5.3 Option 3: Catch-Boards

5.3.1 'Catch-boards' are essentially bespoke shelves or deep trays which are fixed or suspended beneath roost features within the church interior, to catch the bat droppings that cascade down. They are intended to prevent significant and unsightly aggregations of droppings below roosts inside the church, especially in the summer period when roosts are most active.

5.3.2 The catch-boards can be as basic or ornate as the church specifies and Faculty permission allows. Photographs 5.3.1 and 5.3.2 show two examples from other BiC Churches. A pulley system or similar can be incorporated to allow the boards to be lowered for cleaning.

Photograph 5.3.1: Catch-boards installed within the aisle of another BiC Project church, in Leicestershire.

Photograph 5.3.2: Catch-boards (with droppings) installed within the porch of another BiC Project church, in Essex.

5.3.3 In principle, because catch-boards should not have any direct impact on the bats, only their droppings, they can potentially be installed without the need for a licence from Natural England. Instead, catch-boards could potentially be installed in consultation with a suitably experienced bat ecologist via a Precautionary Method of Working (PMoW).

5.3.4 Depending on the nature of the catch-boards they can be a relatively inexpensive approach to mitigating impacts from bat droppings inside churches, and largely unintrusive in respect of the church aesthetics and any heritage considerations.

5.3.5 Catch-boards could reduce the accumulations of droppings below the roost egress and access features inside the aisles of St Andrew's, however, they would not be suitable for the nave. The extra height of the roof and roosts in the nave means that any boards installed could not be accessed easily for cleaning, and so droppings would eventually spill over the shelf and accumulate on the nave floor again.

5.4 Option 4: Acoustic Deterrents

5.4.1 Research by Zeale *et al*. (2014, 2016) into mitigating the impacts of Natterer's bats on churches demonstrated that acoustic deterrents can be an effective way of moving bat roosting sites away from sensitive areas within churches at certain times of year, and that they may be particularly useful for moving Natterer's bat roosts. Zeale *et al*. (2014, 2016) concluded that "*acoustic deterrence has considerable value as a tool for moving bats humanely from specific locations inside churches to*

prevent accumulations of droppings and urine below roosts".

5.4.2 The judicious use of high intensity ultrasound, under licence from Natural England, could potentially help mitigate and reduce some of the problems caused by the Natterer's bats at St Andrew's. It may also be feasible to move roosting bats to locations where droppings can accumulate on catch-boards, and therefore options 3 and 4 can be used in combination. Within St Andrew's, for example, it could be possible to deter bats from roosting in the nave, where deflector boards are unlikely to be effective, in anticipation that the bats would then only roost within the aisles, where droppings *can* accumulate on strategically located catch-boards.

5.4.3 It is important to note, however, that acoustic deterrents are not intended (and would not be licensed by Natural England) to evict bats from churches entirely, and therefore irrespective of where the acoustic deterrents move the bat roost/s to within the church the bats are likely to continue to fly within its interior if they did previously. The use of acoustic deterrents would not, therefore, help reduce the amount of urine and droppings voided by bats in flight at St Andrew's. Furthermore, the bats may also habitualise to the acoustic deterrents in the long-term and return to roost in areas of the church where they are unwanted. Effective and suitable acoustic deterrents are also difficult to source.

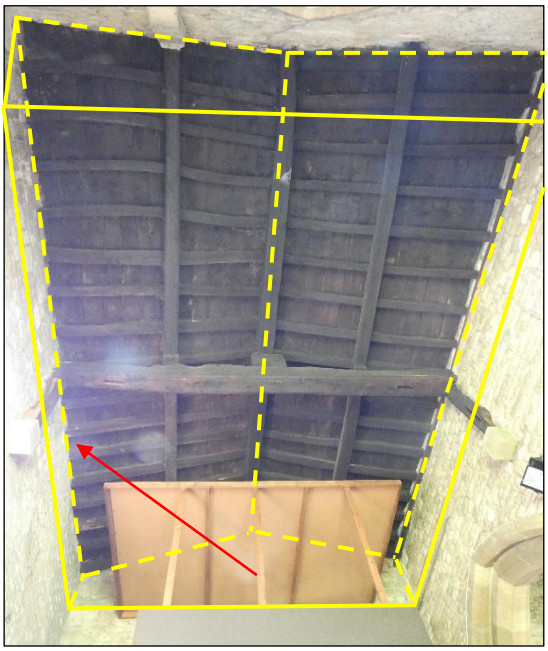
5.4.4 On the above basis the use of acoustic deterrents to help mitigate the bat impacts at St Andrew's was rejected during the initial consultation in September 2021.

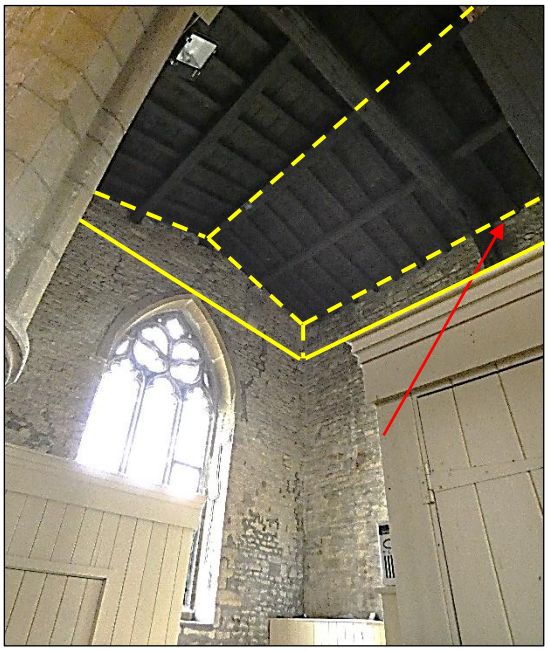
5.5 Option 5: Heated Bat Compartment in North Transept

5.5.1 This option involves constructing a large, bespoke, heated compartment for the Natterer's bats below the ceiling of the north transept, above the kitchen. This compartment would incorporate the main feature currently used by the Natterer's bats to egress and access the church – see photographs 3.2.4 and 3.2.5 above, photograph 5.5.1, and appendix 9.1, target note 2.

5.5.2 The areas sketched in yellow in photographs 5.5.1 and 5.5.2 help illustrate where the bat compartment would be located within the north transept above the kitchen. The red arrows show where the bats currently egress and access the church.

Photographs 5.5.1 (left, taken facing south) and 5.5.2 (right, taken facing north-east): The yellow shapes help illustrate where the bat compartment would be installed within the north transept. This would incorporate the current main egress / access feature used by the Natterer's bats, which is in the location shown by the red arrows.





5.5.3 The simultaneous aims of this approach would be to provide suitable roosting conditions for the

Natterer's bat maternity colony inside the bespoke compartment, and to prevent these bats from accessing the rest of the church interior. If successful, then the issues caused by the droppings and urine deposited by the Natterer's bat colony inside the church would be negated. This approach would correspond to the 'boxing-in' approach trialled successfully by Packman *et al.* (2015) and Zeale *et al.* (2016) with Natterer's bats in other churches.

5.5.4 Importantly, an automated heating system would be required inside this compartment to ensure that conditions were suitably warm for female Natterer's bats to breed and raise their young from May to September each year. This heat source would be required because this compartment would be located on the north-east corner of the church, which receives much less natural warmth from the sun than the south facing aspects.

5.5.5 The temperature range within the compartment from May to September would need to be 15 to 30°C, with at least one area of the compartment maintained at a steady temperature of 22.5°C during the daytime throughout this period. Smith & Racey (2005) determined that many Natterer's bat maternity roosts adjacent to roof coverings average 22.5°C during the day, whereas other Natterer's bat roosts in attic mortise joints or trees were, on average, 20°C and 17.3°C respectively. The maximum ambient roost temperature in which Natterer's bats remained in the roost according to Smith & Racey (2005) was 32°C. Microclimates, with subtle differences in temperature and humidity levels, would need to be created inside the new compartment via partitioning and the creation of 'hot boxes', venting in certain areas, and potentially the installation of bat boxes and use of other techniques.

5.5.6 Additional rough-sawn timber could also be installed inside the compartment to replicate roost habitat used by Natterer's bats elsewhere, such as mortise joints and gaps between roof timbers. Acoustic protection would need to be incorporated into the fabric of the compartment to minimise noise disturbance of the bats when the organ is in use. The compartment would need to be dark inside.

5.5.7 The new compartment would be constructed from wood, preferably to match the existing sarking so that the appearance of the compartment is as discreet as possible and in keeping with the kitchen. An access hatch would need to be installed within the compartment to allow an appropriately qualified person to inspect and monitor the roost, and to facilitate cleaning.

5.5.8 This approach would require a licence from Natural England. The application for this licence would be complex; for example, it would need to include specifications on the heating system and how this would be maintained in perpetuity, precisely how the temperature regimes and microclimates inside the compartment would be created, monitored, and maintained, and how and when the bats would be persuaded to adopt it. A comprehensive monitoring strategy would also be required, and Natural England would expect any interventions to be reversible if bat welfare or the FCS of the local population of Natterer's bats were at risk.

5.6 Option 6: Bat Loft in South Porch

5.6.1 This option comprises the installation of a bespoke new roost space – a bat loft – within the internal space near the apex of the pitched south porch roof. A false ceiling would be installed between the upper purlins as depicted in photographs 5.6.1 and 5.6.2.

5.6.2 This roof space would be south facing and as such it is anticipated that the thermal conditions inside would be favourable (15 to 30°C, see above) for the Natterer's bats to breed and rear young from May to September without the need for an artificial heat source. Subtle temperature and humidity variations would be created inside this bat loft via partitions (e.g., to create 'hot boxes'), venting in certain areas, and other techniques. The existing roof timbers would be retained to provide roosting opportunities. Additional rough-sawn timber could also be installed inside the bat loft to replicate roost habitat used by Natterer's bats elsewhere, such as mortise joints and gaps between roof timbers.

Photographs 5.6.1 (left) and 5.6.2 (right): The internal roof space at the apex of the south porch roof is shown left, with the area that would be converted to a bat loft (by installing a false ceiling) depicted by the red shaded area in the photograph on the right. Two bat access features would be installed. An access hatch would also be installed in the new ceiling to allow for monitoring and cleaning. The roost and access would be retained in darkness.

5.6.3 Two new bat access / egress features would need to be incorporated into the design of this bat loft. Possible options include removing a piece of bedding mortar along the ridge, removing one or two Collyweston tiles or parts of tiles, a discreet new feature in the gable or south-facing verges, and / or a feature connecting the eaves to the loft between the rafters.

5.6.4 Lighting within and near the porch would need to be removed or adjusted to ensure that there was no illumination of any bat egress / access features or the new roost at night.

5.6.5 An access hatch would need to be installed within the new false ceiling to allow an appropriately qualified person to inspect and monitor the roost, and to facilitate cleaning.

5.6.6 If designed and constructed carefully it is anticipated that this approach could have a minimal impact on the visual appearance of the church and its entrance because the false ceiling could be integrated discreetly with the existing roof structure and wider porch interior.

5.6.7 A licence from Natural England would *not* be required to construct this bat loft as there would be no impacts on the bats at St Andrew's from this activity – bats do not currently roost within the porch or use it regularly for any purpose. As such, this bat loft could be constructed at any time subject to Faculty.

5.6.8 Note that a licence from Natural England would be required for any other intervention associated with the construction of this bat loft if this would affect the bats, such as if / when they were excluded from other areas of the church.

5.7 Option 7: Bat Compartment in South Transept

5.7.1 This option involves constructing a large, bespoke compartment for the Natterer's bats below the ceiling of the south transept, within the lady chapel. This compartment would incorporate the main feature used by the Natterer's bats to egress and access the church in the past, which a few Natterer's bats use currently – see section 3.1 and photographs 3.2.6 and 3.2.7.

5.7.2 This compartment would be on the south-east elevation of the church and as such it is anticipated that the thermal conditions inside would be favourable (15 to 30°C, see above) for the Natterer's bats to breed and rear young from May to September without the need for an artificial heat source. Subtle temperature and humidity variations would be created inside this compartment via partitions (e.g., to create 'hot boxes'), venting, and other techniques.

5.7.3 The areas sketched in photographs 5.7.1 and 5.7.2 help illustrate approximately where the bat compartment would be located within the south transept / lady chapel. The new compartment would be constructed from wood, preferably to match the existing sarking / ceiling so that the appearance of the compartment is as discreet and in keeping with the lady chapel as possible.

Photographs 5.7.1 (left) and 5.7.2 (right): The sketched shapes below help illustrate where the bat compartment would be installed within the south transept / lady chapel. This would incorporate the main egress / access features used by the Natterer's bats in the past along the east facing wall plate of the south transept as shown by the red arrow. This compartment should not require an artificial heat source.

5.7.4 The existing roof timbers would be retained inside this compartment to provide roosting opportunities. Additional rough-sawn timber could also be installed inside the compartment to replicate roost habitat used by Natterer's bats elsewhere, such as mortise joints and gaps between roof timbers. The compartment would also need to be dark inside. An access hatch would need to be installed within the compartment to allow an appropriately qualified person to inspect and monitor the roost, and to facilitate cleaning.

5.7.5 This approach would require a licence from Natural England. The application for this licence would need to detail how the necessary microclimates inside the compartment would be created, monitored, and maintained, how roosting habitat would be created within it, and how and when the bats would be persuaded to adopt it. A comprehensive monitoring strategy would also be required, and Natural England would expect any interventions to be reversible if bat welfare or the FCS of the local population of Natterer's bats were at risk.

5.8 Option 8: Large Catch-Board in North Transept

5.8.1 This option involves the installation of a large horizontal 'catch-board' or shelf - see section 5.3 - above the kitchen in the north transept. The aim of this approach would be to protect the kitchen from the droppings and urine voided by the bats as they egress and access the church via the east-facing wall plate of the north transept - refer to photographs 3.2.4, 3.2.5, 5.5.1 and 5.5.2, and appendix 9.1, target note 2. The catch-board would need to span all or most of the kitchen to protect it from the bat droppings and urine.

5.8.2 Photograph 5.8.1 shows the roof area of the kitchen where the catch-board would be installed. It would need to be installed at a height that allows the Natterer's bats to continue to fly through the arch from / into the north aisle, so that they can still access roosts inside the church and egress and access the church via the east facing wall of the north transept.

Photograph 5.8.1: The roof of the north transept above the kitchen viewed facing east from the north aisle. The organ is shown to the right (south). This option would involve installing a large catch-board horizontally above the kitchen to protect it from bat droppings and urine.

5.8.3 This approach would require a licence from Natural England because of the potential impacts on the main bat egress / access feature at St Andrew's, and because a low number of non-breeding Pipistrelles roost within the north transept, for example along the gable wall top. This licence application should be straight-forward, however, providing the Natterer's bats' flightpath to / from the main church egress / access feature was maintained (and monitored initially) because their roosts inside the church would be unaffected.

5.8.4 The main disadvantage of this approach on its own is that it would only solve the issues caused by bat droppings and urine in the kitchen; it does not reduce issues caused by droppings and urine elsewhere inside the church.

5.9 The Preferred BMP Strategy

5.9.1 After detailed consideration of the above options by the church and PCC (RP), the church architect (SB), the BiC Engagement Officer (RR) and Heritage Advisor (RA), and the bat ecologist (MC) these will be presented to Peterborough DAC for comment via a site meeting. Dependent on the outcome of this meeting the most agreeable bat management strategy will be brought forward for Faculty, and licensing by Natural England. Objectives for the proposed strategy will then also be set as will the criteria for evaluating success.

6 References

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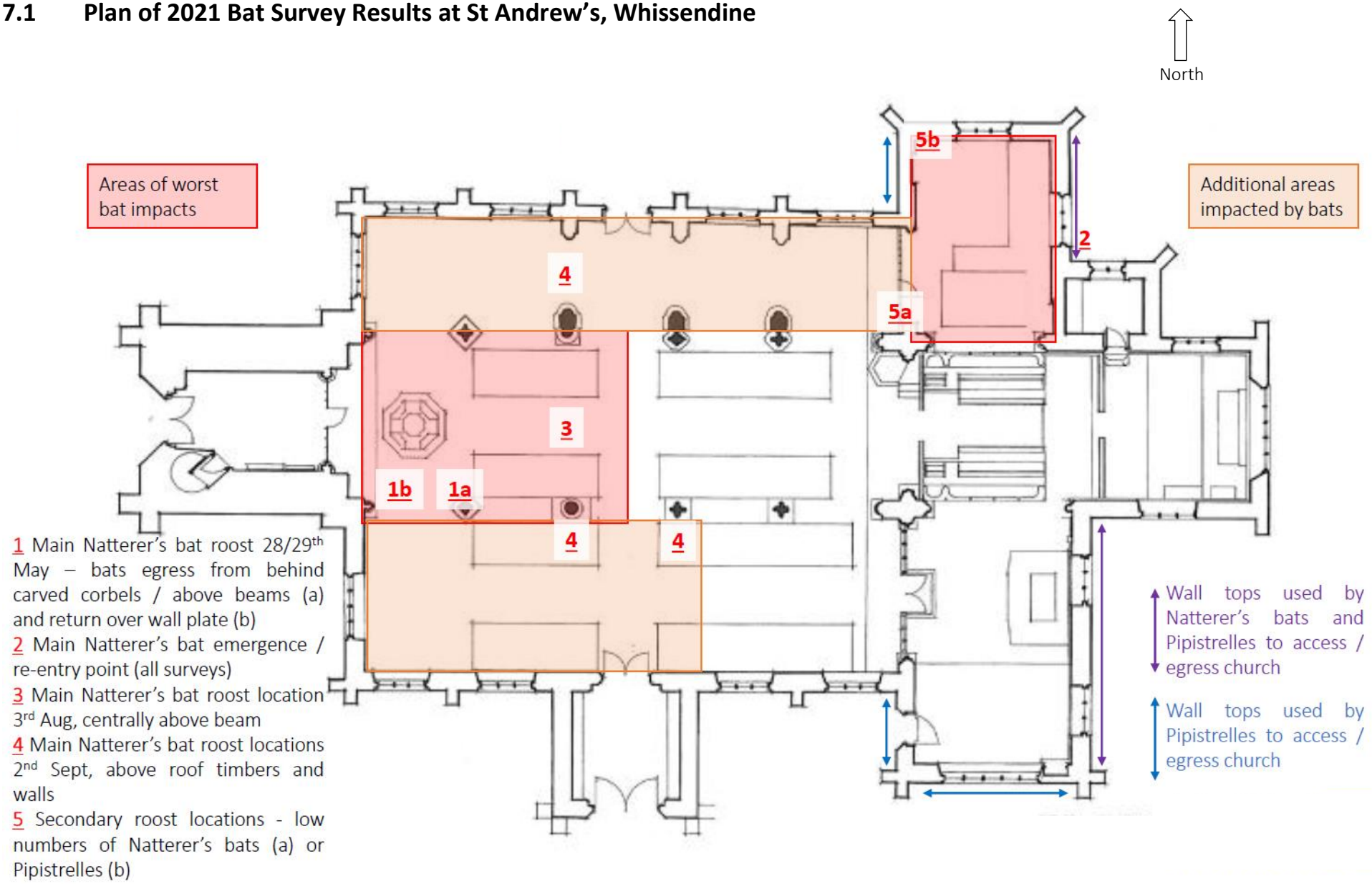
7 Appendices

7.1 Plan of 2021 Bat Survey Results at St Andrew's, Whissendine



7.2 B.A.T. Ecological 2021 Bat Survey Methods

Daytime Bat Roost Assessments and Inspections

7.2.1 An initial bat roost assessment and inspection of the church was completed on 14 April 2021. The principle aims of this initial site visit were to assess the suitability of the various building features within the church for roosting and hibernating bats, and to undertake a search for evidence of bat presence, typically indicated by bat droppings, the remains of prey (such as discarded moth wings), characteristic staining from urine or fur, or the presence of live or dead bats. This site visit was also intended to facilitate planning of the nocturnal surveys in the summer of 2021.

7.2.2 Following on from the initial daytime assessment and inspection, the church interior was assessed again for the above evidence of bat activity prior to the three dusk emergence surveys – see below for dates – to help establish whether the areas of bat activity change through the summer.

Nocturnal Bat Surveys

7.2.3 Four nocturnal bat surveys – three dusk emergence surveys and one pre-dawn re-entry survey - were undertaken at St Andrew's in the summer of 2021. The main aims of these bat activity surveys were to determine the status of the bat roosts at the church and to identify the main areas of bat activity.

7.2.4 Each emergence and re-entry survey involved at least four suitably experienced surveyors watching and listening with bat detectors for any bats exiting from or entering the church, including at least one stationed inside the church on each survey. A minimum of four high-specification infrared cameras (and accompanying infrared illuminators) were used on each survey – see Equipment section for further detail.

7.2.5 Key information regarding possible bat roosts in the church were recorded by surveyors, such as any exit or entry points, roosting locations (suspected or confirmed), any notable flight-lines, times of bat activity, and the bat species concerned.

7.2.6 The nocturnal surveys were all undertaken within the optimum period for bat activity as stated in Collins (ed.) (2016), which is May through September. They were also undertaken within each of the required periods according to Natural England BiCCL criteria (Annex B).

7.2.7 Table 9.2.1 shows the dates and timings for each of the nocturnal surveys undertaken at St Andrew's in the summer of 2021. To allow for any early bat activity the emergence surveys all commenced at least 15 minutes before dusk and extended for at least 90 minutes post-sunset to maximise the likelihood of recording relevant bat activity. Similarly, the re-entry survey commenced over two hours before dawn and extended until after sunrise to allow surveyors more opportunity to observe important bat activity.

Table 9.2.1: Survey dates and timings for each of the nocturnal surveys at St Andrew's in 2021.

Date	Sunset / Sunrise Time	Civil Twilight Starts / Ends	Survey Start Time	Survey End Time
28 May	21:12	21:59	20:30	23:15
29 May	04:47	04:00	02:30	05:00
3 August	20:52	21:33	20:35	22:30
2 September	19:48	20:24	19:30	21:30

7.2.8 The weather was conducive for bat activity on all of the 2021 nocturnal surveys as demonstrated by multiple bats being active in flight on each visit.

Equipment

7.2.9 Equipment used for the daytime assessments and inspections comprised a combination of the following: high-powered Cluson Clulite CB2 and Clu-Briter 1000 lumen torches, ≥450 lumen Lenser P7 LED hand-torches, close-focusing Nikon and Pentax binoculars, a Ridgid Seesnake CA-300 endoscope, an Apple iPad and Panasonic Lumix DC-FZ82 digital camera for photographs, and telescopic ladders for access at height.

7.2.10 High-specification infrared (IR) and thermal imaging (TI) equipment was used on all nocturnal surveys to support surveyor observations. These units comprised a FLIR Scion OTM266 thermal monocular, a Canon XA-30 camera illuminated by a Dedolight DLOBML-BI-IR Redzilla infrared on-board camera LED light head (860 to 960 nm), three Canon XA-11 cameras illuminated by the Dedolight DLOBML-BI-IR or Dedolight DLOBML-IR860 iRedzilla infrared on-board camera LED light heads, and a Panasonic HC-VX980 illuminated by an Evolva T20 infrared light and an infrared floodlight.

7.2.11 Bat detecting equipment used on the nocturnal bat activity surveys comprised a combination of the following FS or Time Expansion units (with Heterodyne audio): four Elekon Batlogger M's, an Anabat Scout, a Pettersson D240x, and two Wildlife Acoustics EMT Pro's. Bat call analysis software used comprised the current versions of Wildlife Acoustics' Kaleidoscope Pro, Titley's Anabat Insight, Elekon BatExplorer, or Pettersson BatSound.

7.2.12 Two-way Baofeng radios were used by the surveyors to communicate relevant survey events.

Personnel

7.2.13 Matt Cook BSc (Hons) MSc MCIEEM led all of the 2021 bat surveys of St Andrew's. Matt is a BiCCL Registered Consultant (RC) with Natural England.

7.2.14 Matt has been a professional bat ecologist and consultant for >13 years. He has been licensed by Natural England to undertake bat surveys for >10 years and he has held the advanced (Level 2) BiCCL since its inception in 2017. In 2017 Matt also acquired the Natural England Bat Low Impact / Mitigation Class Licence. Matt has been licensed to undertake professional bat surveys to an advanced level in England (Class licence levels 3 and 4) since 2014 (licence references 2015-10167-CLS-CLS & 2015-10176-CLS-CLS).

7.2.15 During his time as a professional bat ecologist Matt has led innumerable bat surveys and managed many complex bat projects. He has been the Named Ecologist or RC on over 30 mitigation licenses issued by Natural England for development and renovation work affecting bat roosts of different species and conservation importance in various buildings and structures, including several with heritage listed status. Matt has also been Licensed and Accredited to catch and radio-tag bats on several major infrastructure schemes, and to act as a Lead Ecological Clerk of Works and Accredited Agent in respect of bats on these schemes.

7.2.1 Matt is a Full Member of the Chartered Institute of Ecology and Environmental Management (CIEEM) and is therefore bound by its professional Code of Conduct.

7.2.2 For the nocturnal surveys Matt was assisted by the following experienced bat surveyors:

- James Whiteford MSc CEcol - Natural England Level 2 Class Licence (2015-14621-CLS-CLS), *c*.12 years' relevant professional experience.
- Ben Devine - Natural England Level 2 Class Licence (2018-38121-CLS-CLS), *c*.10 years' relevant professional experience.
- Amy Trewick BSc ACIEEM - Natural England Level 2 Class Licence (2018-37960-CLS-CLS), *c*.9 years' relevant professional experience.
- Nikki Morton MSc ACIEEM - Natural England Level 1 Class Licence (2019-43123-CLS-CLS), *c*.5 years' relevant professional experience.
- Chris Almond – *c.*4 years' relevant professional experience.
- Andrew Neilson – *c*.2 year's relevant professional experience.
- Katrina Caine - *c*.1 years' relevant professional experience.

END OF REPORT